APPENDIX A

The title is amended as follows:

[Buried Heterostructure for Lasers and Light Emitting Diodes]

Growing a Low Defect Gallium Nitride Based Semiconductor

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APPENDIX B

The specification is amended to include the following paragraph on page 1 before line 3:

This application is a continuation of Patent Application No. 09/263,654, filed March 5, 1999 and entitled "Buried Heterostructure For Lasers And Light Emitting Diodes," having Shih-Yuan Wang and Yong Chen as inventors. This application is assigned to LumiLeds Lighting, U.S., LLC, the assignee of the present invention, and is hereby incorporated by reference, in its entirety and for all purposes.

The paragraph beginning on page 2, line 17, is amended as follows:

[The present invention is a laser diode that is constructed in a trench in a manner such that the material in the trench acts as a waveguide. The laser diode includes a first contact layer constructed from a first semiconductor material of a first carrier type, the first semiconducting material having a first index of refraction. The first contact layer has a trench therein, the trench having a bottom surface and side walls. The trench has a layer of a second semiconducting material of the first carrier type on the bottom surface. The second semiconducting material has a second index of refraction, the second index of refraction being at least one percent greater than the first index of refraction. The laser also includes a first dielectric layer covering the first layer in those regions outside of the trench and a first cladding layer constructed from a third semiconducting material of the first carrier type. The first cladding layer overlies the dielectric layer. An active layer for generating light by a

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recombination of holes and electrons, overlies the first cladding layer. A second cladding layer constructed from a fourth semiconducting material of the opposite carrier type from the first carrier type overlies the active layer. A second contact layer of a fifth semiconducting material of the opposite carrier type from the first carrier type overlies the second cladding layer. First and second electrodes provide electrical connections to the first and second contact layers. In the preferred embodiment of the present invention, the bottom surface of the trench and one of the walls of the trench are covered with an electrically conducting coating material on which the second semiconducting material will not nucleate. This embodiment of the present invention is particularly well suited for constructing laser diodes based on group III-V material systems such as GaN.]

A gallium nitride based semiconductor material, and method for its production, that has fewer defects than an underlying gallium nitride based semiconductor material is disclosed. This invention includes the steps of forming a first gallium nitride based semiconductor layer overlying a substrate of a dissimilar material, the first gallium nitride based semiconductor layer having defects due to a lattice mis-match between the substrate and the first gallium nitride based semiconductor layer, forming a trench in the first gallium nitride based semiconductor layer, the trench having a bottom surface and side walls, depositing a first material on a surface of the first gallium nitride based semiconductor layer to prevent a second gallium nitride based semiconductor layer from nucleating on the surface of the first gallium nitride based semiconductor layer, and growing the second gallium nitride based semiconductor layer, of a material different from the first gallium nitride based semiconductor layer, extending from at least one of the side walls, a bottom surface of the trench being of a material such that the second gallium nitride based semiconductor layer will

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not nucleate thereon, the second gallium nitride based semiconductor layer having fewer defects than the first gallium nitride based semiconductor layer.

The paragraph beginning on page 4, line 13, is amended as follows:

The manner in which the present invention gains its advantages can be more easily understood with reference to Figures 3-6, which are cross-sectional views through a GaN-based laser 200 according to the present invention at various stages in the fabrication process. Refer first to Figure 3. Laser 200 is fabricated on a sapphire substrate 210 on which a buffer layer 212 of AlN and a base layer 213 of GaN have been epitaxially grown. A layer of AlGaN is grown on top of layer 213 as shown at 214 and a trench 216 is etched in layer 214. The etching of trench 216 is the only precision masking step in the fabrication process. Trench [214] 216 defines the location of the laser on the substrate.

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APPENDIX C

The Abstract is amended as follows:

[A laser diode that is constructed in a trench in a manner such that the material in the trench acts as a waveguide. The laser diode includes a first contact layer constructed from a first semiconducting material of a first carrier type, the first semiconducting material having a first index of refraction. The first contact layer has a trench therein. The trench has a layer of a second semiconducting material of the first carrier type on the bottom surface. The index of refraction of the second semiconducting material is at least one percent greater than the index of refraction of the first semiconducting material. The laser also includes a first dielectric layer covering the first layer in those regions outside of the trench and a first cladding layer constructed from a third semiconducting material of the first carrier type. The first cladding layer overlies the dielectric layer. An active layer overlies the first cladding layer. A second cladding layer constructed from a fourth semiconducting material of the opposite carrier type from the first carrier type overlies the active layer. A second contact layer of a fifth semiconducting material of the opposite carrier type from the first carrier type overlies the second cladding layer. The invention is particularly well suited for constructing laser diodes based on group III-V material systems such as GaN.]

A low defect gallium nitride based semiconductor, and method for its production, is disclosed. A first gallium nitride based semiconductor layer overlying a substrate of a dissimilar material is grown. A trench is formed in the first gallium nitride based semiconductor layer. A material is deposited on a surface of the first gallium nitride based semiconductor layer to prevent a second gallium nitride based semiconductor layer, of a

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material different from the first gallium nitride based semiconductor layer, from nucleating thereon. The bottom surface of the trench is of a material such that the second gallium nitride based semiconductor layer will not nucleate thereon. The second gallium nitride based semiconductor material is grown, extending from at least one of the side walls of the trench, the second gallium nitride based semiconductor material having fewer defects than the first gallium nitride based semiconductor layer.

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